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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,608	09/29/2003	Tetsuo Ono	520.38979CX1	8510
20457	7590	11/10/2005	EXAMINER	
ANTONELLI, TERRY, STOUT & KRAUS, LLP 1300 NORTH SEVENTEENTH STREET SUITE 1800 ARLINGTON, VA 22209-3873			VINH, LAN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 11/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/671,608

Applicant(s)

ONO ET AL.

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 5-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21 and 22 is/are allowed.
- 6) ☐ Claim(s) 1, 5-8 and 10-20 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/646,012.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment/Argument

1. Applicant's argument, see pages 13-14 of the response, filed 8/12/2005, with respect to the rejection of claim 1 under obvious-type double patenting rejection have been fully considered and are persuasive. The rejection has been withdrawn. The indication of allowable subject matter in claim 4 has been withdrawn in view of newly found reference of Tomioka et al (US 5,897,713)

Claim Objections

2. Claim 10 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The specific frequency range, claimed in claim 10, is already required by claim 1.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11, 19, 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 11, 19 recite the limitation "the percentage of on-period" in claims 1 and 13. There is insufficient antecedent basis for this limitation in the claims.

Claim 20 recites the limitation "the mixing rate" in claim 13. There is insufficient antecedent basis for this limitation in the claim.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 14-15 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 12, 14 of U.S. Patent No. 6,660,647 in view of Kubota et al (US 5,928,528)

Claims 14-15 of the instant claimed invention meet all the limitations of claims 12, 14 of US 6,660,647 except the usage of specific RF ranges. Kubola discloses a method for plasma treatment comprises the step of applying RF of 13.56 MHz and on-off control frequency of 10 kHz (col 6, lines 1-8). Thus, one skilled in the art at the time the invention was made would have found it obvious to modify claims 14-15 of the instant

Art Unit: 1765

claimed invention by using the specific RF ranges as per Kubola because Kubola discloses that RF power pulses of basic frequency of 13.56 MHz, pulse width 10-30 sec, 10 kHz in term of pulse repetition frequency are used as the RF power pulse (col 6, lines 3-6)

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 6, 8, 10, 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Tomioka et al (US 5,897,713)

Tomioka discloses a plasma treatment method to treat a substrate having tungsten /metal of high melting point and semiconductor (col 9, lines 60-63). The method comprises the steps of:

installing the sample 11 on a stage/sample board 12 in a vacuum container (col 7, lines 60-65; fig. 4)

generating a plasma of a gas containing chlorine/ halogen atom inside said vacuum container (col 8, lines 18-19)

Art Unit: 1765

applying a radio frequency bias voltage on the specimen stage/sample board (col 6, lines 40-44)

controlling a periodic on-off of the radio frequency bias voltage with an on-off control frequency of 1kHz to 2MHz. (col 6, lines 10-15; col 7, lines 55-58)

generating a plasma of a gas mixture consisting of CF₄/fluorine gas and oxygen to treat the substrate (col 12, lines 18-30)

Regarding claim 6, Tomioka discloses that the substrate having a lamination of tungsten and polysilicon (col 9, lines 61-63)

Regarding claim 8, Tomioka discloses forming a resist/a mask without carbon on the metal film (col 9, lines 62-65)

The limitation of claim 10 has been discussed above

Regarding claim 12, Tomioka discloses applying RF bias at a frequency of 400 kHz to 2 MHz (col 9, lines 7-9)

6. Claims 13-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Ye et al (US 6,080,529)

Ye discloses a method of etching wherein a substrate where a mask layer without containing carbon as a major component formed on the layer to be processed is laid on a support pedestal/sample board in a vacuum container (col 11, lines 30-35; fig. 5), plasma is generated inside said vacuum container (col 10, lines 64-66), radio frequency bias voltage is applied on said pedestal/sample board (col 10, lines 55-56) and plasma treatment is provided by periodic on-off control radio frequency bias voltage applied on said pedestal/sample board (col 16, lines 60-65), wherein the plasma consists of a

Art Unit: 1765

mixture of chlorine and BCl₃/halogen gas and CH₄/methane/carbon hydride/adhesive gas (col 17, lines 27-34)

The limitations of claims 14-15 have been discussed above

Regarding claims 16-17, Ye discloses adding argon to the gas mixture (col 12, lines 6-10)

Regarding claim 18, Ye discloses mixing NH₃/nitrogen gas with the gas mixture (col 17, lines 30-35)

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8 Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tomioka et al (US 5,897,713) in view of Ye et al (US 6,080,529)

Tomioka method has been described above. Unlike the instant claimed invention as per claim 5, Tomioka fails to disclose maintaining the substrate at the temperature not exceeding 20 degree Celsius

Ye discloses a method of plasma etching comprises the step of maintaining the substrate at the temperature at 20 degree Celsius during treatment/etching (col 12, lines 7-10)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Tomioka method by maintaining the substrate at the temperature at 20 degree Celsius during etching as per Ye because according to Ye, it is known in the art to maintain the substrate temperature at about 20 degree Celsius (col 12, lines 5-10)

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tomioka et al (US 5,897,713) in view of Mihara (US 6,020,111)

Tomioka method has been described above. Unlike the instant claimed invention as per claim 7, Tomioka fails to disclose a sample having a TiN film provided between the tungsten film and the polysilicon film

Mihara discloses a method for manufacturing semiconductor device comprises the step of forming a multilayer films comprises tungsten, TiN and polysilicon and a masking layer of SiON (contains no carbon) on a substrate/sample (col 3, lines 25-30)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Tomioka method by forming a multilayer films on the substrate/sample as per Mihara because according to Mihara, a lamination/multilayer pattern of a silicon film and a metal film capable of reducing damages of an underlying surface layer during patterning (col 1 , lines 48-52)

Allowable Subject Matter

10. Claims 21-22 allowed.

Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 11, 19, 20 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>.



LV

November 03, 2005